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(54) Title of the Invention: Meal Card Adjusting Device For Restaurant Dining Hall

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Specification

1. Title of the Invention

Meal Card Adjusting Device For a Restaurant Dining Hall

2. Claim

A meal card adjusting device for a dining hall in a restaurant or other institution, wherein the meal card adjusting device comprises a register for calculating the cost of a meal based on the menu items selected and amount of money entered by a customer, a meal card reading and writing device for reading the amount of money remaining on the meal card inserted into a slot and subtracting the cost of the meal calculated by the register, and a meal card issuing device for issuing a new meal card with an amount consisting of the amount of cash newly entered in the register minus the insufficient balance when the entered meal card has an insufficient balance.

3. Detailed Description of the Invention

(Industrial Field of Application)

The present invention relates to a meal card adjusting device for a dining hall in a restaurant or other institution in which customers purchase meal cards using cash from an automatic vending machine (card issuing machine) at a dining hall in a restaurant or some other institution, and food and beverages are purchased using this meal card with the balance being adjusted accordingly.

(Technical Background and Problem to Be Solved)

At dining halls in restaurants and other institutions such as the dining hall in a company building, a common dining hall shared by several businesses in a building or surrounding buildings or a dining hall at a school, transactions are often conducted using cash or

magnetic cards. These methods are often combined with tickets used as a cash substitute. Sometimes the tickets are purchased for a set meal and not in a certain cash amount. In all of these methods, payment can be handled without requiring very many employees.

(Purpose of the Invention)

In light of this situation, the purpose of the present invention is to provide a meal card issuing and adjusting device that facilitates further labor savings in a dining hall at a restaurant or some other institution where tickets or magnetic cards are currently being used in the payment system to make menu purchases.

(Summary of the Invention)

The present invention is a meal card adjusting device for a dining hall in a restaurant or other institution, wherein the meal card adjusting device comprises a register for calculating the cost of a meal based on the menu items selected and amount of money entered by a customer, a meal card reading and writing device for reading the amount of money remaining on the meal card inserted into a slot and subtracting the cost of the meal calculated by the register, and a meal card issuing device for issuing a new meal card with an amount consisting of the amount of cash newly entered in the register minus the insufficient balance when the entered meal card has an insufficient balance.

(Working Example of the Invention)

One or more of the meal card adjusting devices of the present invention can be used in a dining hall at a restaurant. Customers insert money into a pre-paid meal card issuing machine (automatic vending machine) and purchase a meal card with the selected amount of money. Customers then select menu items from a self-service line and approach the register, where they pay for the price of the meal using the meal card and cash. If the balance on the meal card is not high enough to pay for a meal, cash is used to purchase a new meal card.

The following is a detailed explanation of the device in the present invention.

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FIG 1 shows a dining hall in which one meal card adjusting device of the present invention is used. This dining hall is equipped with a meal card issuing device 10 to allow customers to purchase meal cards 2 (described below), a self-service line 160 allowing customers to select the desired menu (food) items, and a register line 130 where customers pay a cashier for the menu items. The register line 130 has a register 100, a display 116 connected to the register 100 to display the purchase amount, a meal card issuing machine 115 for issuing meal cards at the point of purchase, a card insertion slot 118 in the counter at the register line 130 to allow customers to pay for a purchase, a card reader/writer 117 for reading the information written on the meal card 2 inserted into the slot 118 and for writing the required information to the card, a collection box 120 for collecting meal cards 2 invalidated by the card reader/writer 117, and a card discharge slot 119 in the counter to allow the card reader/writer 117 to return meal cards 2 to customers. Cards are inserted, processed, recovered and returned in the opposite side of the counter at register 100 and the meal card issuing device 115. In this register 100, a meal card issuing machine 115 operating function and a card reader/writer 117 operating function have been added to the normal functions of a register. The cashier uses a keyboard (not shown) in the register 100 to perform these functions.

In this configuration, a customer inserts money into the meal card issuing machine 10 to purchase a pre-paid meal card 2 of a certain amount (¥1000, ¥5,000, etc.). The meal card 2 used in the present invention is similar to other widely used cash cards (such as quick cards and bank cards) as shown in FIG 2 (A) and FIG 2 (B). [FIG 2 (B) is a cross-sectional view of FIG 2 (A) from X-X.] It is shaped like a credit card and has a magnetic stripe MS on a portion of the surface to read and write data. This meal card 2 is formed on a sturdy paper base material 20, and a characteristic area CP is created in a particular position on the surface to allow the unique characteristics of the meal card 2 to be read.

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At the top are an issue code area NN for the store code where the meal card 2 was issued and the issuing machine code, a serial number area CN for the serial number of the issued meal card 2, a money value area MV for printing the available balance and remaining balance on the meal card 2, an expiration date area ND for printing the purchase data and expiration data of the meal card 2, and a payment record area EE for the totals of purchases made using the meal card 2. As disclosed in Japanese Patent Application No. 59-261980 filed by the present applicant, the unique characteristic data in the characteristic area CP of

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the meal card 2 is printed in the form of barcodes 22, 23 containing magnetic materials with different force retention properties. When a meal card 2 is issued by the meal card issuing machine 10, the unique characteristic data on the meal card 2 is magnetically retrieved from the barcodes 22, 23 formed on the meal card. This characteristic data is then recorded on the magnetic stripe MS. A masking band 21 made from a non-transparent, non-magnetic material is then used to cover the characteristic area CP on which the bar codes 22, 23 have been printed. As a result, the customer and third parties cannot recognize the barcodes 22, 23 underneath the masking band 21. The entire surface of the base material 20 can also be covered by the masking band 21. Identifying characteristics such as a logo, photograph and/or characters (ABC Restaurant) can also be printed on the surface as shown in FIG 2 (A). Data such as the control number of the machine issuing the meal card 2 can also be recorded on the magnetic stripe MS. As explained below, the magnetic stripe MS has an area for recording the expiration date and the balance remaining on the meal card after each use. The surface of the meal card 2 has a name section KN for printing the name of the meal card 2 ("Meal Card"). Instructions (not shown) for using the meal card 2 can also be included. This information can be arranged on the meal card 2 to allow for insertion into a machine in the desired direction.

This meal card 2 is purchased using a meal card issuing machine 10 such as one with the panel configuration shown in FIG 3. In other words, money is inserted by the customer in the coin insertion slot 11 or the paper money insertion slot 12 on the front panel of the meal card issuing machine 10. The numerical value (amount) and operating guide appear on the display device 16 in the front panel of the machine to help the customer make a purchase. When the selection button 13 corresponding to the desired amount has been pressed, the amount available is printed in the monetary value area MC of the meal card, the purchase date and expiration date of the meal card are printed in the expiration date area ND, and the available amount, the expiration date and the meal card number are recorded on the magnetic stripe MS. A meal card 2A with unique characteristics recorded in the characteristics area CP is then discharged from the card issuing slot 17 in the meal card issuing machine 10. Here, the meal card number is a serial number automatically assigned to each meal card 2 issued by the meal card issuing machine 10.

In this way, a customer can purchase one or more meal cards 2 from the card issuing machine 10. When the customer purchases a meal at the dining hall, the customer selects menu items from the self-service line 160 in the direction indicated by A → B in FIG 1. The customer then gets into the register line 130. The meal card 2 is inserted into the card

insertion slot 118 in the direction indicated by arrow C, the meal card 2 is automatically taken in the direction of arrow D, and the cashier enters the price of the menu items into the register 100. The card reader/writer 117 checks the balance on the inserted meal card 2, prints the amount in the monetary value area MV of the meal card 2, magnetically records the remaining amount on the magnetic stripe MS, and returns the meal card 2 to the customer in the direction indicated by arrow E from the card discharge slot 119.

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If the balance on the inserted meal card 2 is not high enough to cover the price of the menu items, the cashier can issue a new meal card for the customer or allow the customer to pay the difference in cash. In either case, the inserted meal card 2 is invalidated and conveyed to the collection box 120 in the direction indicated by arrow F. Because "insufficient amount" is displayed on the display device 118 of the register 100, the cashier may receive cash from the customer to cover the outstanding amount. The transaction is then completed using the register 100. If the customer decides to have a new meal card issued, the cashier receives cash from the customer, enters the desired meal card purchase amount in the register 100, and issues a new meal card to the customer from the meal card issuing machine 115 in the desired amount minus the amount required to complete the current meal purchase.

FIG 4 is a block diagram of the entire configuration inside the dining hall. FIG 5 is a block diagram of the meal card issuing unit inside the meal card issuing machines 10, 115. The following is a detailed explanation with reference to FIG 4 and FIG 5.

The meal card issuing machines 10, 115 will be explained first. Because the meal card conveyor configuration is nearly identical, the meal card issuing device 10 in FIG 5 will be used in the explanation.

The money inserted by the customer into the coin insertion slot 11 or the paper money insertion slot 12 is identified by the money identification device 95 and the total amount is displayed on the display device 16. The money data corresponding to the selection button 13 pressed by the customer is retrieved from RAM 92. An unused meal card 2B stacked in the meal card storage unit 30 is retrieved by the meal card extraction mechanism 30 at the bottom end of the meal card storage unit 30, and the meal card 2B discharged by the meal card extraction mechanism 30 is supplied to a meal card conveyor mechanism 40 consisting of multiple pairs of rollers and two belts installed on these rollers. This conveyor mechanism

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is powered by a motor. The meal card 2B passed along by the meal card conveyor mechanism 40 is optically detected by a print stop position detection sensor 83 consisting of a light-receiving element to stop the card at the predetermined position for printing. A printer 50 is installed at the final stage to print data in the predetermined position on the meal card 2B. The meal card conveyor mechanism 40 is stopped when the printer 50 performs the printing. A write head 72 is also installed at the final end to write data processed by the control device onto the magnetic stripe MS. A characteristic detecting device 70 consisting of a magnetizing means and a magnetic head is installed at the very end of the meal card conveyor mechanism 40 to magnetically read the unique characteristics of the meal card 2B from the barcodes 22, 23. The detection method used by the detection device 70 is described in Japanese Patent Application No. 59-261980 as mentioned earlier. A characteristics reading detection sensor 82 consisting of a light-receiving element is also installed in the final stage to optically detect the transport of the meal card 2B to the characteristics detection device 70. Here, the end reaches the card issuing slot 17. A conveyor detection sensor 81 consisting of a light-receiving element is installed inside the card issuing slot 17 to optically detect the conveyed meal card 2B.

The meal card issuing machine 10 is connected to the data control device 200 via an input/output interface 98. The issuing mechanism in the meal card issuing machine 115 at the register line 130 is nearly identical to the mechanism shown in FIG 5. The internal configuration is nearly the same except that a money identification device is not installed because cash is not inserted. Because the cash is handled at the register 100, the money received from the customer is inserted into the meal card issuing machine 115 and the card is processed in the same manner as issuing device 10. The card reader/writer 117 installed below the counter portion is configured as shown in FIG 4.

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In other words, the meal card 2 inserted into the card insertion slot 118 is conveyed by the card conveyor device 140. The conveyor is controlled at various positions by detecting a conveyor detection sensor 181, characteristics reading detection sensor 182 and a print stop position detection sensor 183. The unique characteristics of the card are detected by the characteristics detection sensor 170 in the same manner as described above and printed by the printer 150. The card data is read by the read head 171 and the necessary data is written to the card using the write head 172. The card reader/writer 117 is connected to the register 100 via a data input/output interface 194.

The operations performed by devices with these configurations in a dining hall will now be explained with reference to the flowcharts in FIG 6, FIG 7 (A) and FIG 7 (B).

When a customer purchases a meal card 2, money is inserted into the meal card issuing machine 10 via the coin insertion slot 11 or the paper money insertion slot 12 (Step S1). The meal card issuing machine 10 then performs the meal card issuing operation. The money identifying device 95 counts the inserted money and displays the total on the display device 16 (Step S2). The selectable selection buttons 13 are lit up based on the amount of money inserted to prompt the customer to select a money amount (Step S3). At this time, shutters (not shown) close the paper money insertion slots 11, 12 to keep the next customer from inserting money to receive a meal card 2. When a selection button 13 has been pressed to indicate a money amount (Step S4), an unused meal card 2 is issued from the meal card storage unit 30 (Step S5) and the meal card conveyor mechanism 40 is activated. When the edge of the meal card 2 has been detected by the print stop position detection sensor 83, the printer 50 prints control data, the purchase data, the expiration date and the available balance in the predetermined space on the card. When the meal card 2 is then detected by the characteristic reader detection device 82, the unique characteristics of the meal card 2 are read by the characteristic detection device 70. Afterwards, the meal card conveyor mechanism 40 is operated in reverse to return the meal card 2, and the read characteristic data is recorded on the magnetic stripe MS (Step S6). Next, the meal card conveyor mechanism 40 is reversed again and a meal card 2A with a recorded monetary value is issued from the card issuing slot 17 (Step S7). If more money has been inserted than has been recorded on the issued meal card 2 (Step S8), change is issued from the coin discharge slot 19 of the coin discharging device (not shown) (Step S9). If no change is to be issued in Step S8, this step is skipped and the control data, inserted amount data, issued card amount data and change data are outputted to the central data control device 200 via the interface 96 (Step S10). The paper money insertion slots 11, 12 are opened (Step S11) and the process returns to Step S1 to handle the next customer.

When the return button 15 is pressed in Step S4 to keep a customer from purchasing a meal card 2 (Step S20), the money insertion slots 11, 12 and the card issuing slot 17 are both closed (Step S21), the inserted money is returned via the money discharge slot 18 (Step S22), and the process returns to Step S1 to handle the next customer.

The following is an explanation of the method used to purchase a meal with a meal card issued in this manner.

A meal card 2 issued in the manner described above is used by a customer. The customer selects a menu item from the self-service line 160 and then inserts the meal card 2 into the card insertion slot 116 in the register line 130 (Step S100). When the edge of the inserted meal card 2 is detected by the conveyor detection sensor 181 in the card reader/writer 117 connected at the bottom of the card insertion slot 116 and the register 100 is used to pay for the menu item via a data input/output interface 194, the card insertion slot 118 is closed to keep the next customer from inserting a meal card 2 while the current meal is being paid for (Step S101). The card conveyor device 140 is operated by the CPU 190, and the meal card 2 is conveyed to the card reader/writer 117.

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While being conveyed, the characteristic data recorded in the characteristic area CP of the meal card 2 is read by the characteristic detector 170, and data such as the control data (meal card number) and the characteristic data (expiration date, balance) written to the magnetic stripe MS is read by the read head 171 (Step 102). Here, the CPU 190 compares the characteristic data retrieved from the characteristic area CP with the characteristic data retrieved from the magnetic stripe MS and determines whether the meal card number is an issued number in order to determine whether the meal card 2 is authentic or counterfeit (Step S103). If the meal card 2 is counterfeit, an alarm sounds (Step S105). If the meal card is authentic (Step S104), the CPU 190 checks the expiration date of the meal card 2 written on the magnetic stripe MS. If the expiration date has passed, "expired" is displayed (Step S123). If the expiration date has not passed (Step S106), the customer menu item prices are entered using the keyboard in the register 100 and the total is displayed on the display 116 (Step S107). The balance on the meal card is then compared to the lowest menu item price established by the dining hall (Step S108). If a menu item cannot be paid for using the balance on the meal card, "adjust" is displayed to indicate that the current card has to be adjusted (Step S122). If the balance of the card is higher than the lowest menu item price, the select button (not shown) in the register 100 is pressed to pay for the menu item or items (Step S110). If the select button is not pressed, the card return button is pressed and the card is returned to the customer (Step S124). When the select button has been pressed, the CPU 190 determines whether the balance on the meal card is greater than the price of the menu items entered using the register 100 (Step S111). If the balance

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is greater, the menu items are paid for. The read head 172 writes the new adjusted balance to the magnetic stripe MS on the meal card 2, the printer 150 prints the new balance in the money value MV area, and the new balance is displayed on the display device 116 (Step S120). The new balance is then compared to the lowest menu item price established by the dining hall. If the new balance can be used to purchase a menu item, the meal card 2 is allowed to be used again (Step S121). The amounts of the purchased menu items and the new balance on the meal card 2 are outputted to the central data control device 200 (Step S125), the card insertion slot 118 is opened for the next customer, and the meal card 2 of the previous customer is returned via the card discharge slot 119 (Step S127).

If "expired" is displayed in Step S123, if the balance on the meal card 2 is determined to be insufficient in Step S108, if the new balance is determined to be insufficient in Step 121, the meal card 2 can no longer be used to purchase meals. "Adjust" is displayed for the balance shown on the display device 116, and the data processing in Step S125 is performed.

If the balance on the meal card 2 in Step S111 is not high enough to cover a menu item, the customer is prompted to pay the remaining amount in cash. The cashier receives cash from the customer and enters the amount in the register 100 (Steps S112, S113). The card reader/writer 117 invalidates the meal card 2, and the meal card 2 is collected in the collection box 120 via a card conveying device 140 (Step S114). The card insertion slot 118 is opened so that the next customer can insert a meal card 2 (Step S130), and the process returns to Step S100 to repeat the purchasing operation.

If the customer is prompted to pay for a new meal card 2 in cash at the register line 130 in Step S112, the cashier receives cash from the customer and enters the amount in the register 100 (Step S116).

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The register 100 subtracts the amount owed from the amount of cash entered to calculate a new total, activates the meal card issuing machine 115 connected to the register 100, records the new total magnetically using the write head, prints the new total using the printer, and issues a new meal card 2 (Step S117). This data is then outputted to the data control device 200 as described above (Step S118). The invalidated meal card 2 is collected by the card reader/writer 117 in the collection box 120 as described above (Step S119), Step S130 is performed for the next customer as described above, the process returns to

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Step S100, and the operations described above are performed. If the cashier is asked to stop a meal purchase by a customer in Step S110, the cashier presses the return button on the register 100 (Step S124). The card insertion slot 118 is opened (Step S126), the meal card 2 is returned via the card discharge slot 119 (Step S127), and the process returns to Step S100 to handle the next customer.

The purchase data from the meal card issuing machines 10, 115 and the register 100 can all be handled by a central data control device 200.

In the explanation of the present invention, all of the controls were also performed by a data control device such as a central computer. However, the card issuing machines, register and adjustment device can also be controlled separately.

(Effect of the Invention)

The meal card adjustment device for dining halls in the present invention uses meal cards to simplify purchases in balance adjustment systems for dining halls of the prior art using tickets, which require more time and labor to operate. This saves time and labor, and the data controls allow for better dining hall management and planning.

4. Brief Explanation of the Drawings

FIG 1 is a simplified diagram of the meal card issuing and adjusting system for a dining hall in a working example of the present invention. FIG 2 (A) and (B) are external views of a meal card of the present invention. FIG 3 is an external view of the control panel on the meal card issuing device of the present invention. FIG 4 is a block diagram of the present invention. FIG 5 is a configurational diagram of the meal card issuing device. FIG 6 is a flowchart of the operations performed by the meal card issuing device. FIG 7 (A) and (B) are flowcharts of the meal card adjustment method used by a restaurant.

2, 2A, 2B ... Meal Card, 10, 115 ... Meal Card Issuing Device, 16, 116 ... Display Unit, 17 ... Card Issuing Slot, 20 ... Base Material, 21 ... Masking Band, 22, 23 ... Barcode Band, 30 ... Meal Card Storage Unit, 40 ... Meal Card Conveyor Mechanism, 50, 150 ... Printer, 60 ... Meal Card Discharge Mechanism, 70, 170 ... Characteristic Detection Device, 72, 172 ... Write Head, 100 ... Register, 117 ... Card Reader/Writer, 118 ... Card Insertion Slot, 119 ...

Card Discharge Slot, 120 ... Collection Box, 130 ... Adjustment Spot, 160 ... Display Shelves, 171 ... Read Head
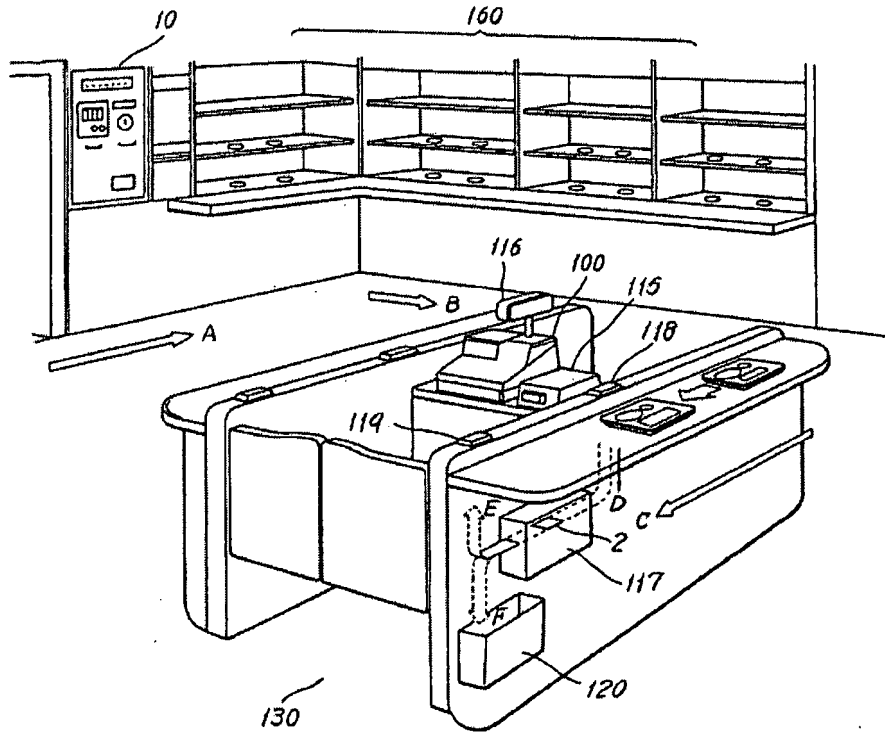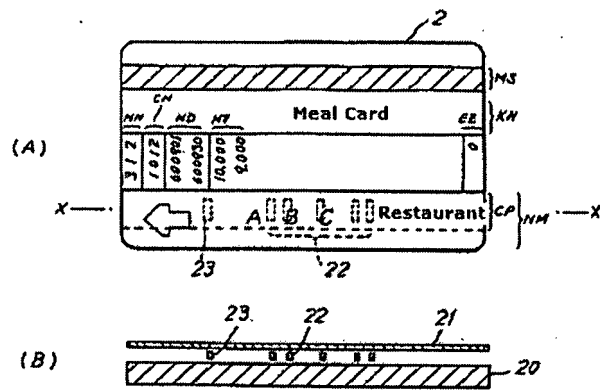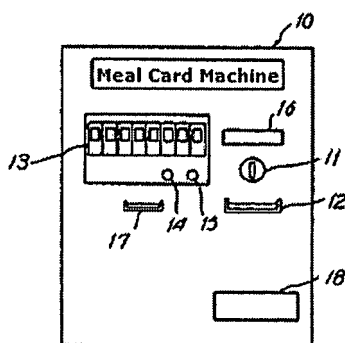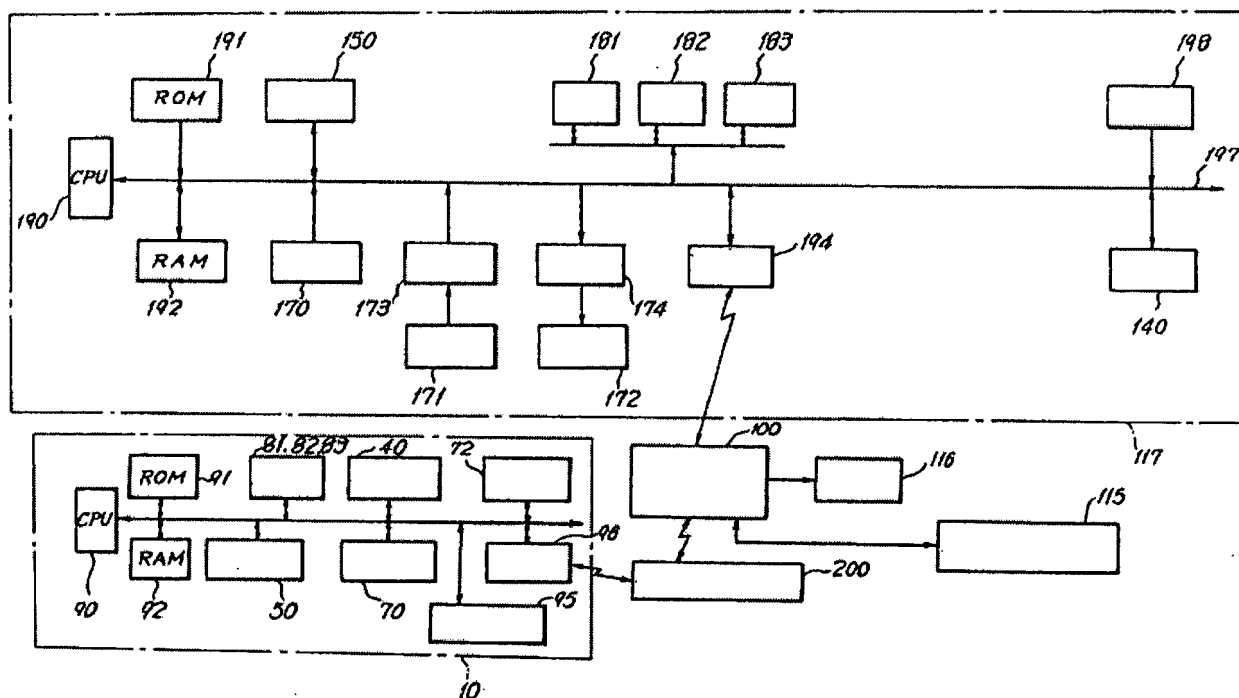
FIG 1

FIG 2

FIG 3

FIG 4

10 ... Money Identification Device, 40 ... Conveyor Device, 50 ... Printer, 70 ... Characteristic Detection Device, 72 ... Write Head, 81, 82, 83 ... Detection Sensors, 96 ... Interface, 100 ... Register, 115 ... Meal Card Issuing Device, 116 ... Display Device, 140 ... Card Conveyor Mechanism, 150 ... Printer, 170 ... Characteristic Detection Device, 171 ... Read Head, 172 ... Write Head, 173 ... Magnetic Stripe Reading Device, 174 ... Write Device, 181 .... Conveyor Detection, 182 ... Characteristic Reading Detection, 183 ... Printing Detection, 194 ... Data Input/Output Interface, 198 ... Expiration Date Checking Circuit, 200 ... Data Management Device
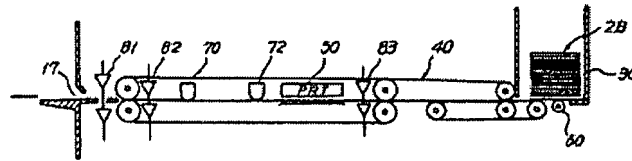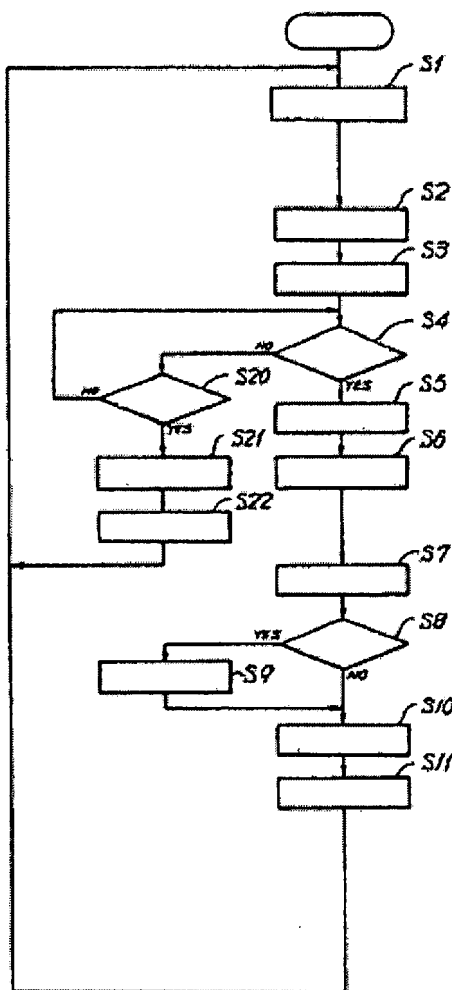
FIG 5

FIG 6

Card Issuing Process

S1 ... Insert Money

S2 ... Display Money Total

S3 ... Approve Payment

S4 ... Select Button ON?

S5 ... Discharge One Card

S6 ... Record/Print

S7 ... Issue Card

S8 ... Prepaid?

S9 ... Calculate Prepayment
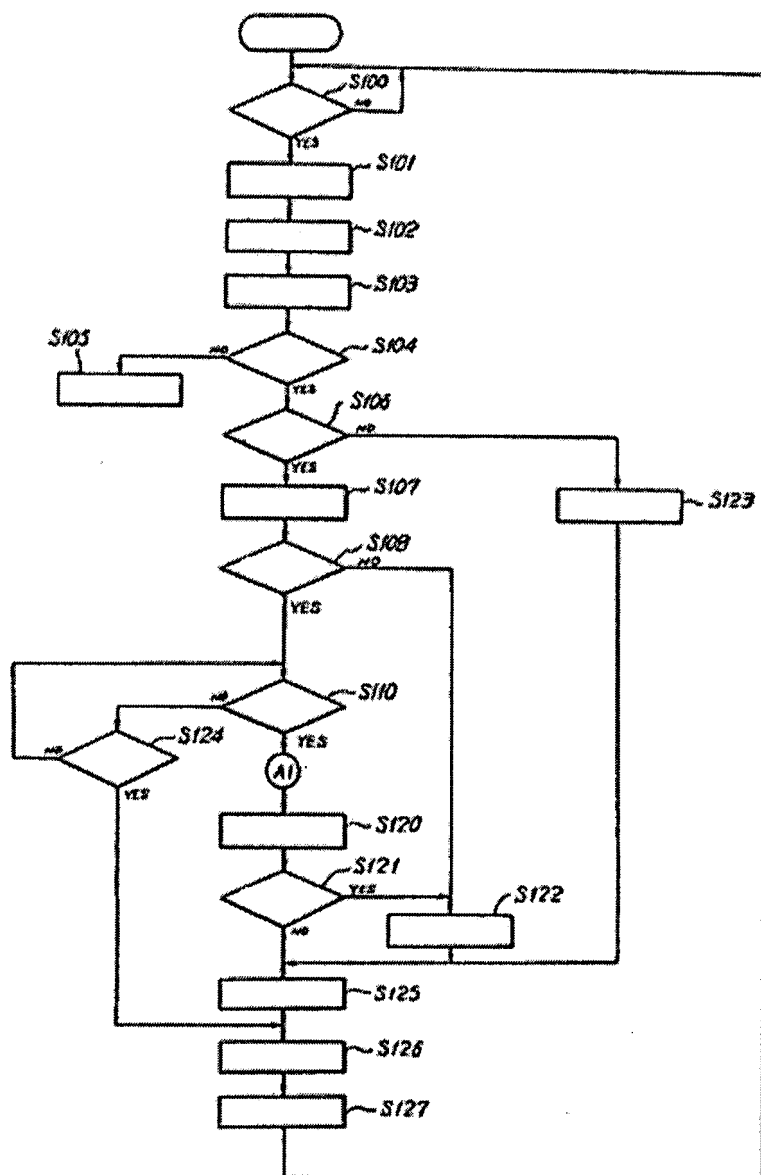
S10 ... Output Data

S11 ... Open Money Input Slot

S20 ... Refund Button ON?

S21 ... Open Money Input Slot

S22 ... Refund Inserted Money

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FIG 7 (A)

Adjustment Process

S100 ... Card Inserted?

S101 ... Open Card Slot

S102 ... Read Card

S103 ... Validity Check

S104 ... Valid?

S105 ... Alarm

S106 ... Expired?

S107 ... Display Remainder

S108 ... Below Minimum?

S110 ... Select Button ON?

S120 ... Update Remainder

S121 ... Below Minimum?

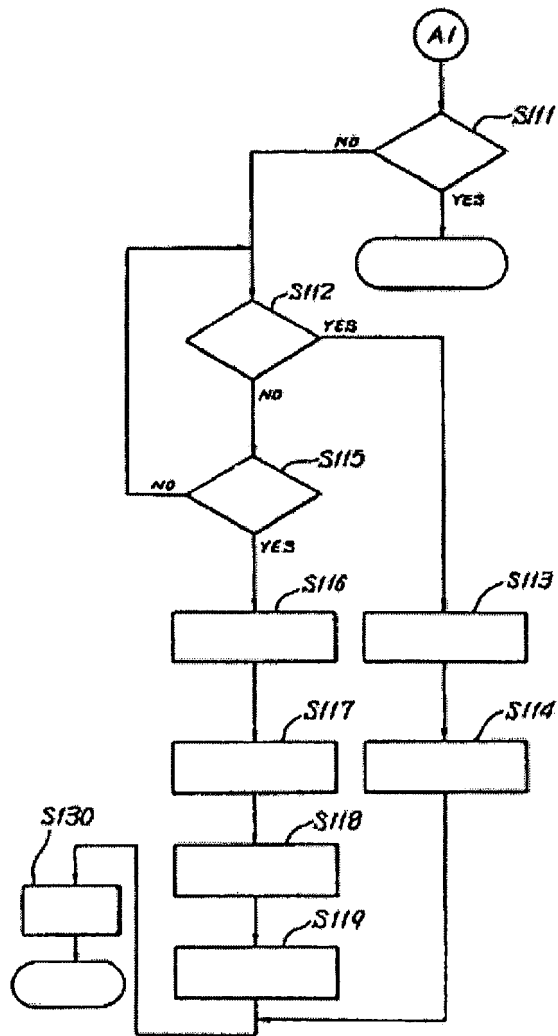S122 ... Display "Adjust

S123 ... Display "Expired"

S124 ... Refund Button ON?

S125 ... Output Data

S126 ... Open Card Slot

S127 ... Refund Card

FIG 7 (B)

S111 ... Remainder ≥ Price? (to Step S120)

S112 ... Cash Entered?

S113 ... Add Money

S114 ... Recover Card

S115 ... Issue New Card?

S116 ... Add Money

S117 ... Insufficient Subtraction/Card Issued

S118 ... Output Data

S119 ... Recover Card

S130 ... Open Card Slot (to Step S100)